

Shock Classification

Shock has four causes: not enough blood left in the tank (hypovolemic), the heart pump broke (cardiogenic), blood vessels opened too wide and leak (distributive), or something blocks the pipes (obstructive). Figure out which one, then fix that broken part.

THE ONE-LINE TRUTH

Shock means blood flow is too weak to feed the body's organs, so waste builds up (lactate rises), the kidneys slow down (less pee), thinking gets fuzzy, skin looks blotchy, and blood pressure drops.

The chain — how it unfolds

1. Blood flow drops below what organs need, so cells can't get enough oxygen (tissue low oxygen (hypoxia)). — why: Oxygen is the fuel cells use to make energy (ATP) in their mitochondria (the tiny power plants inside every cell). When oxygen delivery falls—whether from blood loss, a broken pump, leaky vessels, or a blockage—cells can't run their normal energy factory.
2. Cells switch to anaerobic metabolism (backup energy production without oxygen), which makes lactic acid as waste. — why: Without oxygen, cells break down glucose only partway, producing far less energy and leaving lactic acid behind. Lactate spills into the blood, so serum lactate rises above 2 mmol/L and keeps climbing—this is one of the earliest and most reliable lab clues that shock is happening.
3. The sympathetic nervous system floods the body with norepinephrine and epinephrine (adrenaline), speeding the heart and clamping down skin and gut blood vessels. — why: The brainstem's survival reflex is to sacrifice non-essential organs (skin, gut, muscles) and funnel every available drop of blood to the brain and heart. This is why skin turns cold, pale, and clammy in hypovolemic, cardiogenic, and obstructive shock—it's the body's tourniquet to protect the core.

4. In distributive (septic) shock, the opposite happens: blood vessels dilate wide open and leak, so skin feels warm and flushed even as pressure drops. — why: Bacterial toxins and the immune system's inflammatory chemicals (cytokines like TNF-alpha, IL-1, and IL-6) tell vessels to relax and become porous. Blood pools in the skin and leaks fluid into tissues, so the patient looks warm and red but pressure collapses because blood isn't where it needs to be.
5. The kidneys get less blood flow, so they make less urine (oliguria, under 0.5 mL per kilogram per hour), and waste products like creatinine build up in the blood. — why: The kidneys need steady pressure and flow to filter blood. When flow drops, the kidneys conserve water to try to raise blood volume, but that also means they stop cleaning waste. If shock lasts, acute kidney injury begins—creatinine and potassium rise, and urine output may stop entirely.
6. The brain gets less oxygen, so thinking becomes confused, sluggish, or the patient becomes unresponsive (altered mental status). — why: The brain uses about 20 percent of the body's oxygen even though it's only 2 percent of body weight. When oxygen delivery falls, brain cells can't fire properly—neurotransmitter signaling (the chemical messages neurons send to each other) weakens, and the patient appears disoriented, drowsy, agitated, or unconscious depending on severity.
7. The gut lining begins to break down, and bacteria or toxins can leak from the intestine into the bloodstream, worsening inflammation and infection. — why: The gut is one of the first places the body steals blood from during shock. Without oxygen, the intestinal barrier—normally a tight wall—becomes leaky. Bacteria and endotoxins slip into the blood, amplifying the inflammatory cascade and sometimes triggering sepsis even if infection wasn't the original cause (this is called translocation).
8. If shock continues untreated, multiple organs fail at once (multi-organ dysfunction syndrome, MODS): the heart weakens further, lungs fill with fluid (ARDS), liver stops making clotting factors, and the patient may bleed or clot uncontrollably (DIC). — why: Every organ depends on oxygen. Once the oxygen debt is too large and lactic acidosis (acid from oxygen-starved tissues) is severe, cellular machinery breaks down across the body. The heart can't pump, lungs can't exchange gas, the liver can't detoxify or make proteins, and the clotting system goes haywire because the signals that normally balance clotting and bleeding are lost. At this stage, mortality is very high even with aggressive treatment, which is why early recognition and reversal of shock—before this cascade begins—saves lives.

Spot it — what you see, and why

- Fast heart rate (tachycardia): The heart beats faster to pump more blood per minute when blood pressure drops or the body needs more oxygen — like a pump speeding up to keep water flowing through a kinked hose.
- Low blood pressure (hypotension): Not enough blood is being pushed through the arteries, either because the heart is too weak, too much blood is lost, the blood vessels are too relaxed and wide open, or something is blocking the flow — like a weak pump or a leak in the system.
- Fast breathing (tachypnea): The body tries to pull in more oxygen and blow off acid that builds up when cells cannot get enough oxygen — like breathing harder when you run uphill.
- Confusion or altered mental status: The brain is not getting enough oxygen-rich blood, so it cannot work properly — like a computer running slowly when the battery is low.
- Cool, pale, clammy skin or mottled (blotchy) skin: The body shuts down blood flow to the skin to save oxygen for the brain and heart; mottling shows the tiny blood vessels are not filling well — like turning off the heat in extra rooms to keep the furnace running.
- Slow capillary refill (when you press the skin, color comes back slowly): Not enough blood is reaching the tiny blood vessels in the skin, so they refill slowly after being squeezed — like a garden hose that fills slowly when the water pressure is low.

Red flags — act now

- Blood pressure stays low (systolic under 90) even after giving fluids
- Confusion, no response, or cannot wake the patient up
- Urine output drops to almost nothing (under 0.5 mL per kg per hour)
- Skin turns mottled (blotchy purple) or stays cold and pale
- Heart rate stays very fast (over 120) or becomes very slow and irregular

Treat it — in this order

1. Identify the shock type using history, exam, POCUS, and labs → Knowing whether the problem is bleeding (hypovolemic), a broken heart pump (cardiogenic), leaky infection vessels (septic), or a blockage (obstructive) tells you which treatment will work. Giving fluid to a bleeding patient helps, but giving fluid to a failing heart can drown the lungs. You must name the upstream break before you can fix it.

2. For bleeding shock: stop the bleeding (surgery, endoscopy, angiography with embolization), give blood products in balanced 1:1:1 ratio (packed red cells : fresh frozen plasma : platelets), and give IV crystalloid (normal saline or lactated Ringer's) cautiously → Stopping the source ends the volume loss. Transfusing blood replaces what was lost and restores oxygen-carrying capacity. Balanced ratios prevent dilution of clotting factors. Fluid helps fill the pipes temporarily. Together, these restore blood volume and pressure so organs get oxygen again and lactate drops.
3. For heart-pump-failure shock (cardiogenic): emergency catheterization and stenting (PCI) if it is a heart attack, inotropes (dobutamine at 2.5–20 mcg/kg/min or milrinone), vasopressors (norepinephrine) if pressure is very low, and mechanical support (intra-aortic balloon pump, Impella, VA-ECMO) if drugs are not enough → PCI opens the blocked artery feeding the heart, restoring blood flow to dying muscle. Inotropes make the weakened heart squeeze harder (positive inotropy). Vasopressors raise blood pressure by tightening vessels. Mechanical pumps take over part or all of the heart's job, giving it time to recover. Together, these restore forward blood flow to the body.
4. For infection shock (septic): give broad-spectrum IV antibiotics within 1 hour of recognizing septic shock (current Surviving Sepsis Campaign guideline), give 30 mL/kg IV crystalloid fluid bolus in the first 3 hours, and start norepinephrine (first-choice vasopressor) to keep mean arterial pressure ≥ 65 mmHg if fluids alone do not work → Antibiotics kill the bacteria or fungus causing the infection. IV fluids fill the leaky, dilated blood vessels. Norepinephrine tightens (constricts) the vessels so pressure comes back up and organs get blood flow despite the leakiness. Together, these control the infection, restore pressure, and improve blood flow (perfusion).
5. For blockage shock (obstructive): drain fluid around the heart (pericardiocentesis with needle and catheter) for cardiac tamponade (the heart squeezed by fluid around it), give clot-busting drugs or suction out clots (catheter-directed thrombolysis or embolectomy) for massive pulmonary embolism (a clot lodging in a lung artery), or place a large-bore needle and chest tube for tension pneumothorax → Removing the obstruction lets blood flow freely again. Draining the heart sac lets the heart fill and pump. Breaking up or pulling out lung clots lets the right heart pump blood through the lungs. Releasing air from the chest lets the lung re-expand and lets veins return blood to the heart. Pressure and blood flow (perfusion) come back almost immediately once the blockage is gone.

Your top priorities at the bedside

1. Get two large-bore IV lines (18-gauge or bigger) in place immediately and prepare for fluid bolus or blood transfusion — why: Shock means cells are starving for oxygen; large IVs let you push fluids or blood fast to raise blood pressure and deliver oxygen to organs before they die

2. Start continuous monitoring with blood pressure cuff cycling every 3 to 5 minutes, pulse oximeter, cardiac monitor, and place Foley catheter to measure urine output every hour — why: MAP below 65 means organs are not getting enough blood; urine output below 0.5 mL per kg per hour means kidneys are shutting down; heart rhythm changes show if shock is from heart problem
3. Draw blood for lactate, complete blood count, type and cross-match, troponin, blood cultures before antibiotics, and basic metabolic panel — why: Lactate above 2 means cells are using backup energy without oxygen; hemoglobin shows bleeding; troponin shows heart attack causing cardiogenic shock; cultures guide antibiotics for sepsis